

Road & Pedestrian Safety Audit

Harrison HS, Battle Ground MS & Burnett Creek ES Area
Area Plan Commission of Tippecanoe County
May 2017



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Road and Pedestrian Safety Audit Background

- Location:** At Harrison High School, Battle Ground Middle School and Burnett Creek Elementary School
- Geographic Area:** County Farm Road (CR 50W) from 1,700' north to 3,500' south of CR 600N, CR 600N Corridor from 3,800' west to 2,800' east of County Farm Road
- Date:** May 4, 2017
- Owner:** Tippecanoe County & Tippecanoe School Corporation
- Purpose:**
- Develop a safer means for buses, faculty, staff, students and parents to enter and exit the school properties.
 - Reduce the travel speeds along both road corridors.
 - Improve vehicular safety in both corridors.
 - Develop a safer place for students and residents to walk and ride bicycles from the existing residential subdivisions to the schools and other subdivisions.

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Existing Conditions: (See Map (page 3) and Summaries that follow)

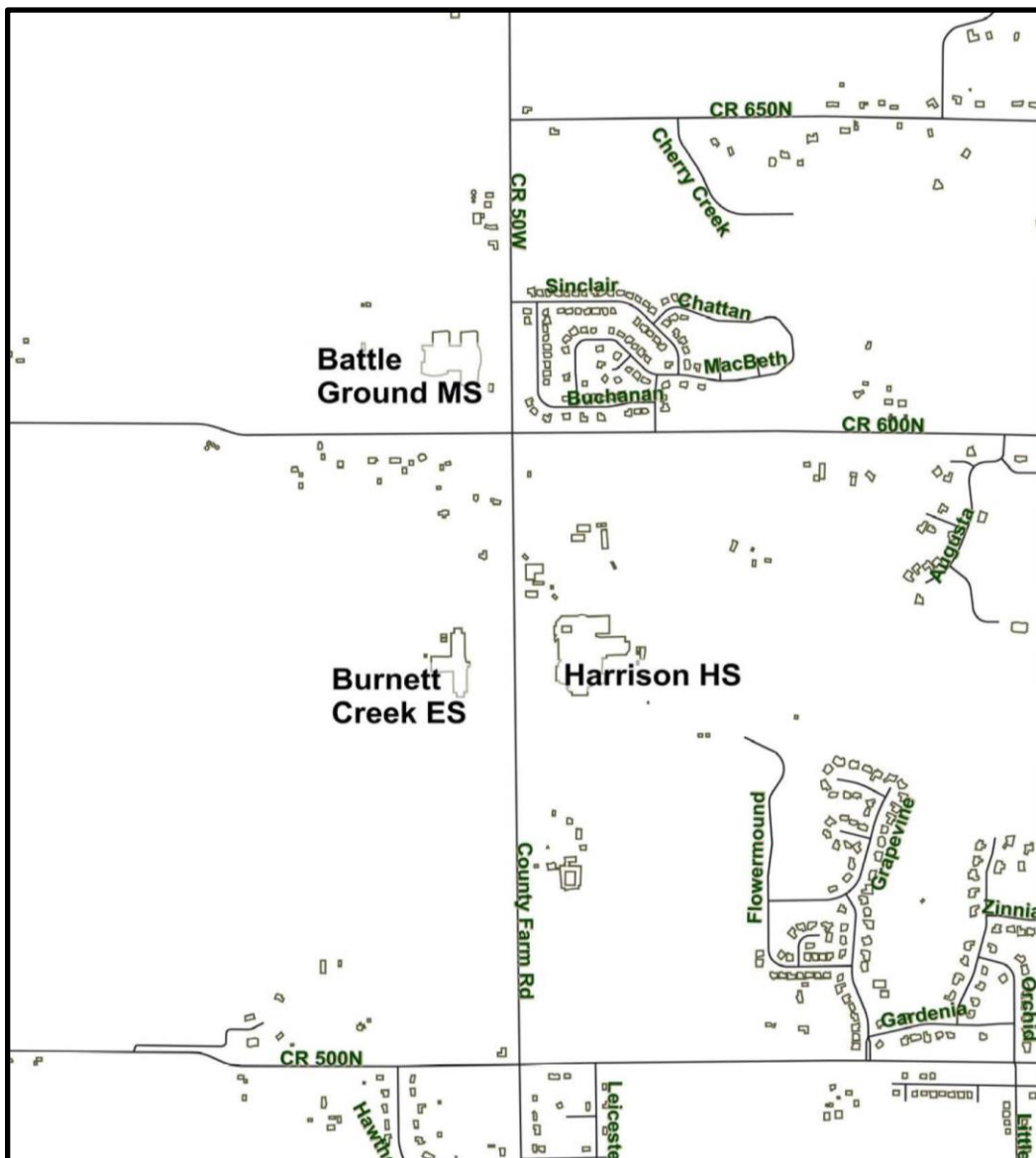
County Farm Road is a two lane rural road functionally classified as an Urban Minor Arterial south of CR 600N. North of CR 600N, it's classified as an Urban Major Collector.

North of CR 600N, the highest elevation point is approximately 1,500 feet north of the intersection. Between that point and the intersection, the road decreases in elevation by nearly 30 feet. There is no change in horizontal alignment. South of the intersection, the road increases in elevation by 14 feet up to the northern Harrison/Burnett Creek driveway. From that point it decreases again by 14 feet to the Cole Ditch. At the Cole Ditch the elevation increases by thirty feet to CR 500N, which is nearly a half mile to the south.

The pavement is rated in fair condition. South of CR 600N, the average travel lane width is 12' and north of CR 600N it's an average of ten and a half feet. There are some auxiliary/passing lanes and right turn lanes at the school driveways. The shoulders are a combination of pavement (average three foot on either side) and grass south of CR 600N and earth/ gravel (width varies) and grass north of CR 600N. The width of the grass shoulders varies throughout the corridor.

The posted speed limit is 50 mph with the school zone posted as 30 mph (with a time plaque of 7 to 9 and 2 to 4). The southern boundary of the school zone is located approximately one hundred feet south of the school property boundary, which is approximately four tenths of a mile south of CR 600N. From there the school zone ends just north of the Battle Ground Middle School property line.

Land use along the corridor is transitioning from a rural setting to one with suburban development. Outside of the school properties, land use is currently a mixture of farm land with a handful of single family homes. The Tippecanoe Villa is located off of County Farm Road; just south of the schools. The Villa is an assisted living residential care facility. There is one residential subdivision at the northeast corner of the intersection at CR 600N. The subdivision, Harrison Highlands, will contain 175 single family homes when fully built out.



Map of the Harrison, Battle Ground and Burnett Creek area

Additional residential subdivisions are located to the south of the study area and include Hawthorne Ridge (25 lots) and Shepard's Point (37 lots). The Auburn subdivision is a new subdivision that is under construction and it will have 222 single family homes. In addition, Winding Ridge is expanding by an additional 18 lots and will be expanding in the future. Both are located south of CR 500N.

No sidewalks or trails current exist along County Farm Road. There are also no sidewalks in the three existing subdivisions. Sidewalks are planned in two new ones.

There are no street lights throughout the corridor.

Harrison High School and Burnett Creek Elementary School Driveways

There are currently two driveways accessing County Farm Road for both school properties. The driveways for each school are located across from the others thus forming two intersections. The northern driveway/intersection is located 1,450 from the CR 600N intersection and other is located just approximately 880 feet south of the north driveway/intersection. Both northern driveways each have one lane entering and two lanes exiting (right and left designated turn lanes). The southern driveways are slightly different. The one for the elementary school has one entering and two exiting while the one for Harrison is only one lane entering and one lane exiting.

On County Farm Road, the configuration is nearly the same at both of the driveway/intersections. There is one through lane and a passing lane for each travel direction. The passing lanes do act as turning lanes as well.

At Harrison/Burnett Creek north driveway/intersection looking toward County Farm Road



On County Farm Road looking south to the south driveway/intersection



Battle Ground Middle School Driveway

One driveway currently provides access to County Farm Road. It is located across from Sinclair Drive which is the only access from Harrison Highlands to County Farm Road. The driveway for the Battle Ground Middle School is three lanes wide with one lane for entering traffic and two exiting lanes. The pavement markings are very faint and it appears that one lane is a right turn lane with the other being a left and through lane. There are wide tapers on both sides, and they are wide enough to accommodate vehicles passing vehicles wanting to turn left. The driveways are approximately 1,000 feet north of the CR 600N intersection.

On County Farm Road looking at the Battle Ground MS driveway



CR 600N is a two lane rural road, functionally classified as a Rural Minor Collector, west of the County Farm Road intersection. East of the intersection it is classified as an Urban Minor Arterial. Beginning approximately a half mile to the west, the road is fairly level until approximately 900 feet west of the intersection. At that point the elevation drops by twenty-two feet. East of the intersection, the road continues to drop in elevation by approximately ten feet until it crosses Burnetts Creek. The creek is a half mile east of the intersection. There are no horizontal changes to the county road.

The pavement is rated in good condition. West of County Farm Road, the travel lanes are approximate 10' wide. East of County Farm Road, the travel lanes are approximately 13.5' wide. The shoulders west of the intersection are a combination of earth and gravel with grass drainage. The width varies. East of the intersection there are two asphalt shoulders with grass drainage.

The posted speed limit is 50 mph with the school zone posted as 30 mph between the times of 7:00 to 9:00 and 2:00 to 4:00. The school zone begins just west of the Battle Ground Middle School property line and ends just east of Fergusson Drive.

Land use along the corridor is also transitioning from rural to suburban. East of the intersection there is recent residential development with Harrison Highlands and Winding Creek (88 lots). Winding Creek is part of the Coyote Crossing development which is a combination of residential housing around a golf course. The other residential component of Winding Creek accesses CR 500N and there are 180 residential lots in that part.

West of County Farm Road there are a few single family residential homes located across from the Battle Ground Middle School. Just west of the school, two residential subdivisions are being developed. Fieldstone is the one being developed on the norther side of the road and it will have 232 single-family lots. Timberbrook will be constructed on the south side of the road and it contains 124 single family residential lots.

No sidewalks currently exist along CR 600N. While there are no sidewalks within Harrison Highlands, there are internal sidewalks in Winding Creek. Internal sidewalks will be constructed within Timberbrook and Fieldstone. It should also be noted that a sidewalk/trail will be constructed along the county road when the Timberbrook subdivision is being constructed.

There are no street lights throughout the corridor.

Battle Ground Middle School Driveway

One driveway accesses CR 600N. It is located approximately 900 feet west of County Farm Road. The driveway is wide enough for three lanes and it appears the lane markings have worn away. Since they have worn away, there are no specific left turn lanes. The driveway has additional pavement to create a small deceleration/acceleration area.

At Battle Ground MS west driveway and looking south



County Farm Road and CR 600N Intersection is currently a four-way stop controlled intersection. There is only one entering and one exiting lane at each leg of the intersection. There are no separate left or right turn lanes. The approach and exit lanes are twelve feet wide but they do taper just before approaching the stop bar. There are no street lights at the intersection.

Transit service is currently not available. The schools are located outside of the taxing district.

Residential Development in this area is increasing, specifically in single family residential homes. In addition to the subdivisions previously mentioned, the following residential subdivisions are within a two mile radius of the schools.

- Winding Creek (north): 87 single family homes;
- Winding Creek (south): 179 single family homes;
- Lauren Lakes: 135 single family homes;
- Prophets Ridge: 182 single family homes;
- Hartwood Village: 53 single family homes;
- The Villas at Stonebridge: 92 condominiums;
- Arbor Chase: 198 single family homes;
- The Village of Arbor Chase: 123 single family homes;
- The Estates of Arbor Chase: 28 single family homes;
- Westport: 72 single family homes;
- Hadley Moors: 305 single family homes;
- Kimberly Estates: 150 single family homes;
- Lakeview: 19 single family homes;
- Greentree at West Lafayette: 40 retirement condominiums

Traffic Characteristics: (See Map and Summaries that follow)

County Farm Road carries 5,719 vehicles per day (2015) just north of CR 500N. Just north of CR 600N, the most recent traffic count (2016) recorded 2,048 vehicles per day.

Over the last eight years the amount of vehicular traffic has remained fairly constant both north and south of CR 600N.

CR 600N carries 4,435 vehicles a day (2016) just west of Fergusson Drive. Tippecanoe County counted 2,134 vehicles a day in 2016 west of County Farm Road.

While historically the traffic counts have varied only slightly east of County Farm Road since 2006, it has doubled west of the schools over the last nine years.

Crash History: (See Map and Summaries that follow)

Thirty-eight crashes occurred in the two corridors between January 2011 and December 2015. Ten of those crashes were serious enough that fifteen people were injured. One crash involved a motorized bicycle and the driver was injured. There were no fatalities.

Of the thirty-eight crashes, eighteen (47.7%) of them occurred during a two hour period. Nine of those crashes occurred between 7:00 a.m. and 8:00 a.m. while the other nine occurred between 2:00 p.m. and 3:00 p.m.

Another of the most notable similarities of those reported crashes is when they occurred in relation to the lighting condition. Twelve crashes occurred when it was dark and another seven occurred when it was either dawn or dusk. Combined, that is 19 crashes which accounts for half (50.0%) of all the crashes.

As for weather conditions, seventeen of the crashes occurred when it was clear (44.7%) and Twenty-one occurred when the pavement was dry (55.3%). Thirteen of the crashes occurred when it was raining, snowing, sleeting or freezing rain. Seventeen of the crashes occurred when the pavement was wet and five occurred when there was water, snow, slush, or ice present on the road surface (44.7%).

There were four crashes which had multiple injuries. Of those crashes, three were rear end crashes while the fourth was a right angle crash. Three of the crashes also occurred when it was raining and the pavement was wet.

Looking at the manner of collision, there were nine different types reported. Over a third of them (fourteen or 36.8%) were rear end collisions; right angle collisions followed in second (eight or 21.1%). There were seven run off the road collisions reported. The crash reports showed that there were three head on collisions and two same direction sideswipe collisions.

Looking at the primary factor, over a quarter (26.3%) of the crashes were attributed to following too closely. The same number of crashes were attributed to failure to yield right-of-way. There were five crashes in which an animal (deer) was in the roadway. Four crashes each were attributed to going off the right side of the road and driving too fast for the weather conditions.

The other notable statistic was the age of the persons involved. Over thirty percent were between the ages of 15 and 19. Looking more closely at the crash reports, there were 23 crashes when the driver was in that age group. Of those twenty-three crashes, 14 of them were caused by a driver who was in that age group.

Fourteen of the thirty-eight crashes occurred at the Harrison/Burnett Creek driveways and two of them involved injuries. In reviewing the crash reports, a significant number (nine or 64.3%) were caused by drivers younger than 20 years old. Over forty percent, six crashes) were right angle crashes and four were rear end crashes. Failure to yield was shown on nine of the reports as the primary factor.

There were only two crashes reported near the Battle Ground Middle School driveway on CR 600N. The manner of collision for both of them was running off the road. Both occurred when it was dark and when the pavement was wet or icy.

Looking at the intersection of County Farm Road and CR 600N, eleven crashes occurred during the five years. Five crashes, which involved seven persons, were reported with injuries. Over half of the crashes occurred when it was dark or at dusk/dawn. The majority, seven crashes, were rear end crashes and two involved deer.

The crash analysis did not include those that occurred on school property.

Team & Resource Discussion



Road and Pedestrian Safety Audit Observations and Analysis

The RPSA team provided the following information, observations and thoughts during the initial background briefing, during the on-site visits and follow-up group discussion.

Current Student Population:

Harrison: 1,845 students (*approximately 600 students are registered to park on the campus*)
Battle Ground: 605 students
Burnett Creek: 765 students

Arrival & Dismissal Times:

Harrison High School:

Morning: 7:10 to 7:30
Afternoon: 2:30 to 3:00

Battle Ground Middle School:

Morning: 7:30 to 7:45 (*teachers start arriving around 7:00*)
Afternoon: 2:30 to 2:45 (*teachers start leaving around 2:45*)

Burnett Creek:

Morning: 8:45 to 9:00 (*parents begin arriving around 8:30*)
Afternoon: 3:30 to 3:45 (*parents begin arriving around 2:30*)
Teachers Arrive between 7:30 to 7:45

Buses:

Harrison: 31
Battle Ground: 11
Burnett Creek: 9*

Note: Another bus will be added during the 2017-2018 school year.*

Harrison High School Observations

Bus Movements

- The buses currently enter at the southern entrance and exit at the northern entrance.
- There is not enough space in front of the school (west side) for all of the buses to park. Currently there are only 26 spaces. Some buses are currently double parked.
- The driveway between the rear of the buses and the curb is fifteen feet.
- Buses currently pull up on the curb in order to allow enough room for buses to pass.
- Bus stalls are currently striped at fourteen feet wide.
- At least one bus will be added during the 2017 to 2018 school year.

Traffic Generated by Teachers

- Teachers enter and exit at both driveways.
- Teachers park only in the west parking lot.

Traffic Generated by Parents

- Parents enter and exit at both driveways in the morning and evening.
- Parents drop off students at the north and south sides of the building.
- Parents are discouraged to drop off or pick up their children where the buses park.
- Compliance is fairly good.

Traffic Generated by Students

- Students enter and exit the school ground at both driveways during the morning and evening.
- Students park in all of the lots surrounding the school except for the west lot.
- All of the parking lots are nearly full every day.
- No students walk to school.
- Vehicles driven by students turning left onto to the northern driveway queue as far back and even past the CR 600N intersection in the morning. At times, the vehicle queues extend past the intersection and on County Farm north of the intersection and east of the intersection of CR 600N.

Additional Issues

- The all-way stop at the northern driveway causes considerable back up issues.
- Students cross the all-way stop to access the auxiliary building in the morning and afternoon at the same time students and parents are arriving and leaving.
- An expansion is planned in the near future and the location will be on the northeast corner of the building where a parking lot currently exists.
- The existing tennis courts will become a parking lot when the expansion occurs.
- At this time there has been no decision as to where the tennis courts will be relocated.
- The building may be expanded again in future.
- There is currently no access driveway to CR 600N.
- Staff direct traffic in the morning and afternoon at the all-way stop.
- A Sheriff's deputy periodically directs traffic at the northern driveway in the afternoon.
- A hill at the north driveway is an issue.
- A sight distance issue exists at the south driveway due to grade change.
- By 2020 there may be an additional 400 to 500 students.

Battle Ground Middle School Observations

Bus Movements

- The buses currently enter at the eastern driveway and exit at the southern driveway.
- There are enough spaces in front of the school (east side) for all of the buses to park. Currently there are only 16 spaces.

Traffic Generated by Teachers

- Teachers park in the southern parking lot.
- Teachers have a difficult time reaching the school due to vehicles going to Harrison especially during the morning.

Traffic Generated by Parents

- Parents drop their children off at the south entrance of the school.
- There are no capacity issues with parents dropping their children off.
- The queue of parent's vehicles are longer when there is inclement weather. There are times when the queue does extend to CR 600N, but it never extends onto 600N.
- Parents cut through the Harrison Highlands subdivision to get to the middle school.

Burnett Creek Elementary School Observations

Bus Movements

- The buses currently enter at the northern driveway and exit at the southern driveway.
- There are enough spaces in front of the school (southeast side) for all of the buses to park. Currently there are only 14 spaces.

Traffic Generated by Teachers

- Teachers park in the southwestern parking lot.
- Teachers have a difficult time reaching the school due to vehicles going to Harrison.

Traffic Generated by Parents

- Parents drop their children off at the southwestern entrance of the school.
- There are no capacity issues with parents dropping their children off, and traffic usually runs smoothly.
- The parents line up through the parking lot and on the driveway.
- The line of cars rarely backs onto County Farm Road.

Additional Issues

- It can be difficult to turn left onto County Farm Road.
- No students walk to and from school.

- The driveway around the building at the north part of the school was removed due to expansion. Vehicles can no longer travel around the building.
- Open house and evening school functions are challenging in regard to parking. There is not enough parking so people park at the high school and walk to the elementary school. A shuttle is provided.

Other Issues and Observations

Travel Speeds

- Travel speeds, especially on County Farm Road, are an issue.
- Current speed limit is 50 mile per hour, but people drive in excess of that.
- Speed limit in the school zone is 30 miles per hour.
- The school zone south on County Farm Road needs to be extended further to the south.

Intersection at CR 600N

- Road is slippery when wet.

Other Comments

- Signage along the County Farm Road Corridor was upgraded a year ago and all of the new signs are oversized.
- Students who will live in the new subdivisions that are being constructed immediately west of the school will want to walk to the schools.
- There are approximately 40 to 45 elementary students, 20 to 25 middle school and 20 to 25 high school students living in the Harrison Highland subdivision.

CR 50W Traffic Study, Tippecanoe County, Indiana

The County Commissioners hired Butler, Fairman & Seufet to conduct a traffic study with the objective of determining what, if any, upgraded traffic control would improve the operations at the intersections of County Farm Road at CR 500N and CR 600N and to provide preliminary options for improving traffic operations at the north and south Harrison High School driveways.

The study involved collecting existing roadway geometry data and existing traffic data. This was done through intersection turning movement counts and roadway tubes. Data was collected for the typical morning and evening peak hours as well as for the peak afternoon time period when Harrison students leave school. Sight observations during the peak periods were also conducted.

The study identified that the all-way stop located on the Harrison school property at the northern driveway causes a capacity bottle neck and creates significant queueing on CR 50W north of the north driveway, north of the CR 600N intersection and on CR 600N east of the CR 50W intersection. The reason the all-way stop creates the bottle-neck is due to several vehicle

and pedestrian travel paths crossing each other. Those paths consist of: 1) Student and staff vehicles entering traffic; 2) Buses and parent drop-off vehicle exiting traffic; and 3) Pedestrians crossing between the main school building and the secondary buildings north of the driveway.

Relocating some of the travel paths that cross each other was the solution put forward in the study. Two options were suggested and they targeted student drivers. The first option would require all students entering to use only the south driveway. The second option would be to construct a third access driveway and it would connect to CR 600N at the Harrison Highlands driveway.

Several design changes were proposed and discussed for the CR 600N intersection. The first change was to signalize the intersection, but at this time the existing traffic volumes do not warrant a signal. The traffic volumes are close to the minimum threshold though. A signal may also cause issues with platoons of vehicles that all want to turn into Harrison High School. The second change involves additional left-turn lanes for each approach and additional right turn lanes at the northbound and east bound approaches only. The last design change was the installation of a roundabout. While it was pointed out that they do have calming effects, they are challenging to young inexperienced drivers and the existing traffic flow conditions may not provide enough gaps to allow vehicle to enter the roundabout.

Nearly identical recommendations were suggested at the CR 500N intersection but without the roundabout.

In summary, the study provided four recommendations:

- 1) Continue the discussion between the Tippecanoe County highway department and Harrison High School for options to improve the capacity bottleneck of the school's all-way stop intersection.
- 2) Consider the general traffic safety and traffic calming benefits of roundabouts at the CR 600N and CR 500N intersections in comparison to the possible negative capacity operations associated with unfamiliar student drivers and peak 15 minute dominant flows.
- 3) Begin the design process for installation of a traffic signal and turn lanes at the intersection of CR 50W and CR 500N to improve the existing safety operations and future capacity operations.
- 4) Begin the design process for installation of a traffic signal and turn lanes at the intersection of CR 600N to improve future capacity operations. However, strong consideration should be made as to when the intersection should be upgraded in relation to the possible improvement of the school's all-way stop intersection.

Road and Pedestrian Safety Audit Recommendations

After putting together the results of crash data, personal observations and discussion, it is clear what the issues are as well as what needs to be done to address them. The recommendations in this report came from the audit, the traffic study and follow up discussions from the RSA team members.

Driveway Crashes and Congestion, Harrison High School and CR 600N

The most significant issue to be addressed is the considerable vehicular demand of high school students, parents, faculty and staff (from the high school and middle school), and buses during the peak periods in the morning and afternoon. This is clearly shown in the crash data. In order to properly address the demand and subsequent crashes, improvements will need to be made to the roadway system as well as on the high school property.

As pointed out in the traffic study and by team member observations, there is a significant vehicular demand from persons coming from the north and east. To address this, there are several possible options.

The first option would be to remove, or significantly reduce, the demand on County Farm Road and at the CR 600N intersection by providing an alternative path to access the high school grounds. The alternative would involve constructing a new access driveway from CR 600N to the high school parking lots along the eastern property line. The driveway would line up across from the Harrison Highlands subdivision driveway.

A second option involves improvements to both the County Farm Road and the north driveway on the high school property. Improvements to the county road would include reconstructing the north driveway/intersection and the north and south approaches. With the considerable demand noted in the traffic study, the improvements should go as far north as the CR 600N intersection. At the driveway/intersection, left turn lanes would be constructed on County Farm Road. The left turn lane on County Farm road north of the driveway/intersection would need to be extended longer than normal to accommodate the significant demand. A combination through and right-turning traffic lane would handle those two movements. Since there is a significant left turn demand, a traffic signal at the driveway/intersection should be investigated to help direct the traffic flow.

Another improvement to both county roads involves reconstructing them to an urban cross section. With an urban cross section, the speed limit can be reduced to slow traffic traveling in the corridor. In addition, wide sidewalks need to be constructed on both sides of the road to accommodate students walking to and from school. When these facilities are constructed, students have an alternative way to get to and from school other than driving or riding the bus.

Street lighting needs to be added since a significant number of crashes occurred when it was dark or at dusk/dawn.

Looking at the north driveway and at the all-way stop on the high school property, several options are available. As the traffic study pointed out, congestion at the stop is a result of the number of paths that cross at that location.

The first option would be a reduction or elimination of students crossing the all-way stop. This could be accomplished by delaying the students crossing in the morning or having them cross early before the end of the last class period. Other possible changes that could be done to remove students crossing include eliminating the first and last period use of the secondary building and/or relocating the secondary buildings.

A second option would be to eliminate all traffic that goes to and leaves from the secondary buildings north of the north driveway during the two peak periods. Signs could be installed or the driveway could be closed off during the two peak periods.

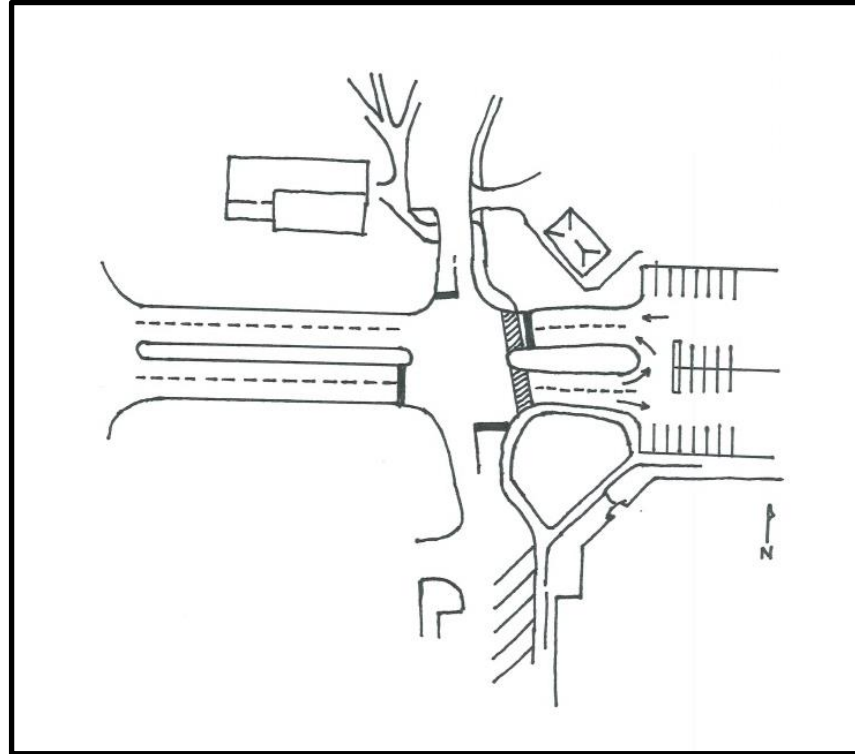
A third option involves parents dropping off and/or picking up students. Having parents use only the south driveway to both enter and exit would reduce the demand at the all-way stop.

Another possible reduction in the number of paths crossing would be eliminating all traffic traveling in the opposite direction of flow in the morning and afternoon. With the exception of buses, vehicles only enter in the morning and exit in the afternoon. Additional capacity can be added if there were some alterations to the driveway and all-way stop (**Figure 1**). The driveway could be widened to accommodate two travel lanes entering and two exiting. Between the all-way stop and parking lot, the access road could be split with two travel lanes in each direction. By doing this, vehicles can easily access both aisles in the parking lot. With this design, the number of paths for student walking can be reduced from two to one with a wide sidewalk being constructed on the east side of the all-way stop.

While there were more crashes at the northern driveway/intersection, there are also crashes at the southern driveway/intersection too. Buses going to the high school enter at this driveway during the morning and afternoon. During both peak periods, students and parents enter and exit as well.

This audit recommends the driveway/intersection to be reconstructed to a similar design as the northern driveway/intersection. The new design includes individual left turn lanes for both the north and south bound approaches, a combined right turn and through lane, street lighting and wide sidewalks. It would also be an urban design.

Figure 1, Propose North Driveway Reconfiguration



Bus Parking at Harrison High School

As point out, another challenge is bus parking on the high school property. There are simply not enough lined spaces to meet the existing demand. Currently there are 27 spaces physically marked in front of the school. With 31 buses, that leaves four without any parking spaces.

Several solutions that would address this involve expanding the current staging area or relocating it. Currently the stalls are seventeen feet wide and the parking area is approximately 460 feet wide. To accommodate five additional buses, the width needs to be widened by 85 feet.

The one option would be to relocate the staging area to the south side of the building. In order to accomplish this, the south lot and driveways would need to be reconstructed in an entirely different configuration in order to keep a single-lane chevron bus parking pattern. **Figure 2** shows a possible reconfiguration. The buses would pull in and travel eastward along a new main driveway aisle and then make a “U” turn and park facing toward the school. The space in between the two aisles would be for student parking. A challenge that would need to be addressed is safe routes for students to walk if they park behind the buses.

Another option would be to expand the existing staging area southward. In order to do this, the driveway to the circle drive would need to be relocated and the main driveway to the west parking driveway and area would need to be slightly altered. **Figure 3** shows a possible reconfiguration of the existing staging area.

Figure 2, Relocated Bus Staging Area

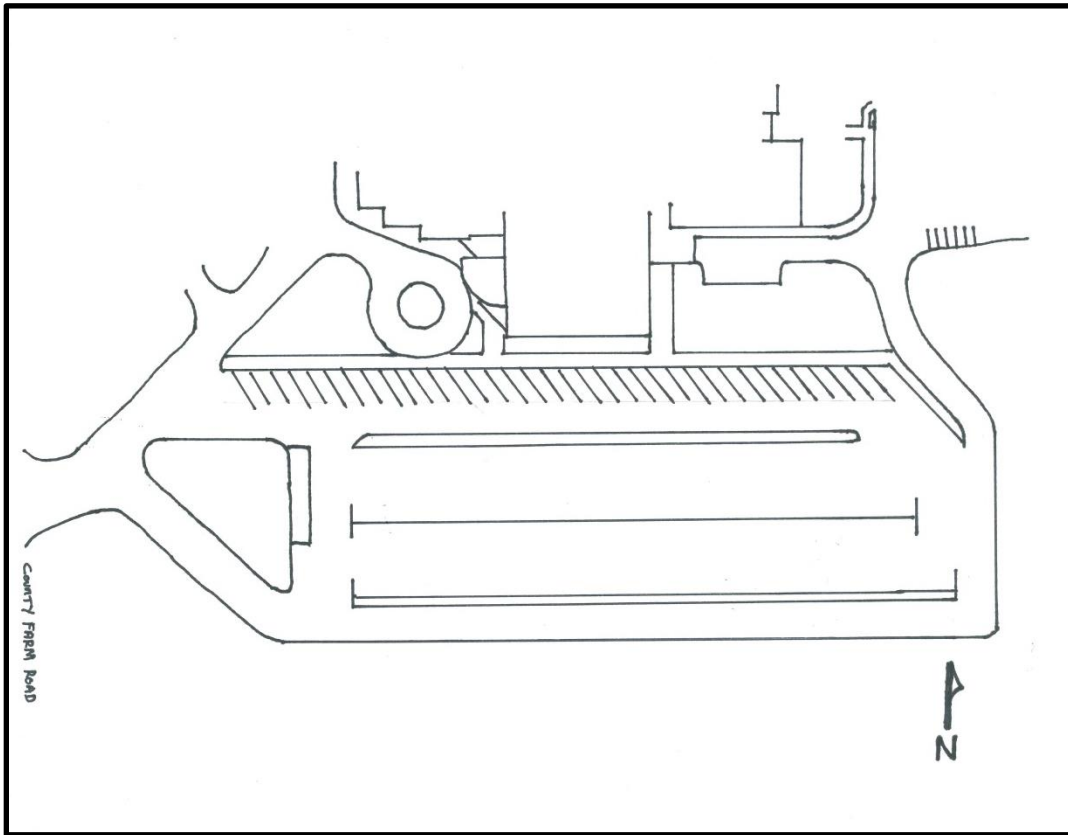
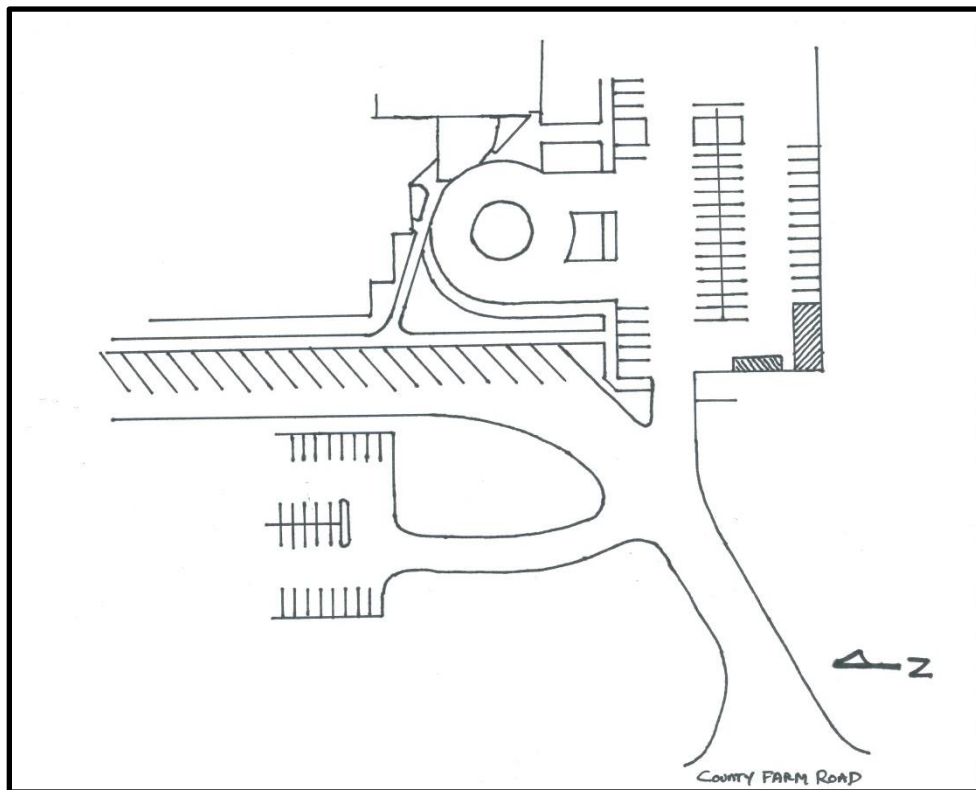


Figure 3, Figure Expanded Staging Area



If it is decided to continue to use the existing staging area, the driveway needs to be widened. This would eliminate the need for buses to pull up onto the curb so there is enough clearance for buses to pass.

Parking at Burnett Creek Elementary School

Due to the number of students enrolled at the elementary school, parents attending functions in the evening are challenged to find parking spaces around the building. They currently park in the lots at the high school and walk over. At this time there are no facilities that provide a safe path for the parents and students to walk from and to the high school parking lots.

There are two options possible to address this problem. The first would be for the school corporation to widen the parking lots at the elementary school. Another solution would be to utilizing the existing lots at the high school and construct a wide and safe sidewalk between the two schools. At County Farm Road, a pedestrian activated warning system should be installed since the crossing is not located at either of the driveways.

Travel Speed

During the audit, travel speed was recognized as an issue and two solutions were discussed. One involves increasing the presence of officers in the area. Additional presence and speed enforcement does increase compliance of the speed limit. This would be a short-term solution and could be implemented fairly quickly.

The other solution relates to the perception of drivers. Travel speeds on both roads are higher since the roads are of a rural design with wide clear zones on either side. The second solution involves changing the perception of the driver by changing the road cross section to an urban design. This would be a long-term solution.

Intersection Improvements

Several improvements were proposed in the traffic study and this audit recommends those should be pursued.

Housing Expansion and Walking to School

The area around the three schools is one of the designated planned areas that will see additional growth in both residential and business development. The Area Plan Commission recently adopted a 2045 Metropolitan Transportation Plan. That plan predicts that there will be 2,225 homes constructed and 3,975 jobs in the vicinity by 2045.

Around the three schools, the land is transitioning from farmland to single-family residential subdivisions. While this is occurring, the roads need to transition from a rural design to an urban design. The urban design must accommodate people walking and bicycling. The new Metropolitan Plan recommends the two roads be improved to an urban design.

Future High School Building Expansion

It was reported during the audit that the school corporation is looking to expand the high school building in order to accommodate additional students. With the expansion, there would be changes to the parking and parts of the grounds used for sports. This audit recommends that the school corporation invest in developing a campus master plan to address both near and long term expansions and traffic patterns. The master plan would coordinate the expansion and any new parking as well as changes to any of the areas currently used for sports. It would help both internal and external traffic, as well as students, faculty and staff walking on campus. The master plan would be very useful in coordinating any future road improvements to County Farm Road and CR 600N.

Additional Pictures

Looking north at the all-way stop at Harrison HS



Looking west at the all-way stop at Harrison HS



Looking east at the all-way stop at Harrison HS



Looking south at the all-way stop at Harrison HS



On County Farm Road and looking north toward CR 600N



On County Farm Road and looking south toward CR 600N



On CR 600N and looking toward County Farm Road



On County Farm at the southern driveway/intersection and looking south



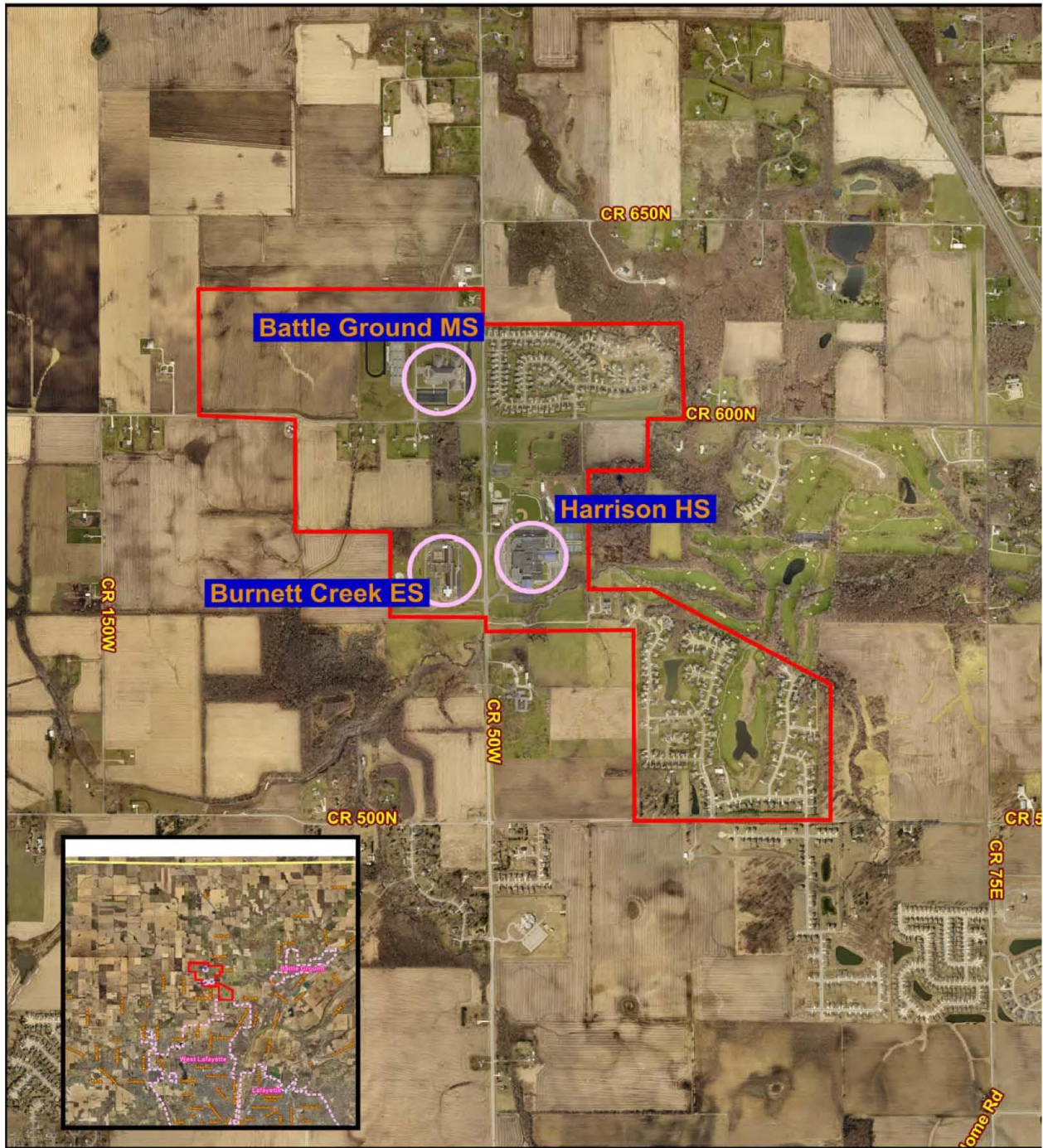
On County Farm at the southern driveway/intersection and looking north



On County Farm Road at the northern driveway/intersection and looking north



Aerial Photography of Harrison, Battle Ground, Burnett Creek and Surrounding Neighborhoods



2014/2015 Aerial Photography



Harrison Road Safety Audit

Roadway Inventory

CR 50W (north of CR 600N)

- Functional Classification: **Urban Major Collector**
- Road width average: **21 Feet**
- Shoulder Type: **Earth/Gravel**
- Shoulder Width: **Varies**
- Pavement Condition: **Fair**
- Posted Speed Limit: **50 mph**
- Posted Speed Limit School Zone: **30 mph (7to 9 & 2 to 4)**

CR 50W (south of CR 600N)

- Functional Classification: **Urban Major Collector**
- Road width average: **24 Feet**
- Shoulder Type: **Asphalt**
- Shoulder Width: **3 feet**
- Pavement Condition: **Fair**
- Posted Speed Limit: **50 mph**
- Posted Speed Limit School Zone: **30 mph (7to 9 & 2 to 4)**

CR 600N (west of CR 50W)

- Functional Classification: **Urban Major Collector**
- Road width average: **20 Feet**
- Shoulder Type: **Earth/Gravel**
- Shoulder Width: **Varies**
- Pavement Condition: **Good**
- Posted Speed Limit: **50 mph**
- Posted Speed Limit School Zone: **30 mph (7to 9 & 2 to 4)**

CR 600N (east of CR 50W)

- Functional Classification: **Urban Major Collector**
- Road width average: **27 Feet**
- Shoulder Type: **Asphalt**
- Shoulder Width: **2 feet**
- Pavement Condition: **Good**
- Posted Speed Limit: **50 mph**
- Posted Speed Limit School Zone: **30 mph (7to 9 & 2 to 4)**

Location of Crashes around Harrison HS, Battle Ground MS & Burnett Creek ES



[illegible]

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Harrison H.S. Area

Crash Report Information, January 2011 through December 2015

#	Date	Time	Vehicles Involved	Number Injured	Number Dead	Manner of Collision	Primary Factor	Light Condition	Weather Conditions	Surface Condition	Damage Estimate
1	1/26/2011	0714	2	0	0	SAME DIRECTION SIDESWIPE	FAILURE TO YIELD RIGHT OF WAY	DARK (LIGHTED)	CLOUDY	DRY	\$1001 TO \$2500
2	3/3/2011	1445	2	1	0	RIGHT ANGLE	FAILURE TO YIELD RIGHT OF WAY	DAYLIGHT	CLEAR	DRY	\$5001 TO \$10000
3	3/22/2011	0720	2	0	0	RIGHT ANGLE	FAILURE TO YIELD RIGHT OF WAY	DAWN/DUSK	CLEAR	DRY	\$5001 TO \$10000
4	10/13/2011	0718	2	0	0	REAR END	FOLLOWING TOO CLOSELY	DAWN/DUSK	RAIN	WET	\$1001 TO \$2500
5	2/23/2012	1439	2	0	0	RIGHT ANGLE	FAILURE TO YIELD RIGHT OF WAY	DAYLIGHT	CLOUDY	WET	\$2501 TO \$5000
6	5/31/2012	1544	2	2	0	REAR END	SPEED TOO FAST FOR WEATHER CONDITIONS	DAYLIGHT	RAIN	WET	\$2501 TO \$5000
7	6/6/2012	1158	2	3	0	REAR END	FOLLOWING TOO CLOSELY	DAYLIGHT	CLEAR	DRY	\$5001 TO \$10000
8	7/22/2012	0018	1	1	0	RAN OFF ROAD	RAN OFF ROAD RIGHT	DARK (NOT LIGHTED)	CLEAR	DRY	\$2501 TO \$5000
9	8/28/2012	0545	1	0	0	RAN OFF ROAD	RAN OFF ROAD RIGHT	DARK (NOT LIGHTED)	RAIN	WET	UNDER \$1001
10	8/31/2012	0725	2	0	0	RIGHT ANGLE	FAILURE TO YIELD RIGHT OF WAY	DAYLIGHT	CLEAR	DRY	\$1001 TO \$2500
11	9/3/2012	0246	1	0	0	RAN OFF ROAD	ANIMAL/OBJECT IN ROADWAY	DARK (NOT LIGHTED)	CLOUDY	WET	\$1001 TO \$2500
12	9/24/2012	0727	3	0	0	REAR END	OTHER (DRIVER) - EXPLAIN IN NARRATIVE	DAWN/DUSK	CLEAR	DRY	\$1001 TO \$2500
13	11/19/2012	0725	2	0	0	REAR END	FOLLOWING TOO CLOSELY	DAYLIGHT	CLEAR	DRY	UNDER \$1001
14	11/29/2012	1900	1	0	0	COLLISION WITH DEER	ANIMAL/OBJECT IN ROADWAY	DARK (NOT LIGHTED)	CLOUDY	DRY	\$1001 TO \$2500
15	12/13/2012	1545	2	0	0	REAR END	FOLLOWING TOO CLOSELY	DAYLIGHT	CLEAR	DRY	\$2501 TO \$5000
16	12/20/2012	1430	2	0	0	REAR END	SPEED TOO FAST FOR WEATHER CONDITIONS	DAYLIGHT	RAIN	WET	\$5001 TO \$10000
17	3/5/13	1723	2	0	0	OPPOSITE DIRECTION SIDESWIPE	ROADWAY SURFACE CONDITION	DAWN/DUSK	SNOW	SNOW/SLUSH	\$1001 TO \$2500
18	5/7/13	1445	2	0	0	REAR END	FOLLOWING TOO CLOSELY	DAYLIGHT	CLEAR	DRY	\$5001 TO \$10000
19	5/21/13	2155	1	1	0	HEAD ON	LEFT OF CENTER	DAYLIGHT	CLEAR	DRY	UNDER \$1001
20	6/25/13	0754	2	0	0	REAR END	FOLLOWING TOO CLOSELY	DAYLIGHT	CLEAR	DRY	\$2501 TO \$5000
21	8/22/13	1445	3	2	0	REAR END	FOLLOWING TOO CLOSELY	DAYLIGHT	RAIN	WET	\$10001 TO \$25000
22	10/6/13	0209	1	0	0	RAN OFF ROAD	RAN OFF ROAD RIGHT	DARK (NOT LIGHTED)	RAIN	WET	\$1001 TO \$2500
23	11/26/13	0554	1	1	0	RAN OFF ROAD	SPEED TOO FAST FOR WEATHER CONDITIONS	DARK (NOT LIGHTED)	CLOUDY	ICE	\$10001 TO \$25000
24	12/9/13	0640	1	0	0	COLLISION WITH DEER	ANIMAL/OBJECT IN ROADWAY	DARK (NOT LIGHTED)	CLOUDY	SNOW/SLUSH	\$1001 TO \$2500
25	12/20/13	1239	2	0	0	RIGHT ANGLE	FAILURE TO YIELD RIGHT OF WAY	DAYLIGHT	RAIN	WET	\$5001 TO \$10000
26	3/5/14	1915	1	0	0	RAN OFF ROAD	ROADWAY SURFACE CONDITION	DARK (NOT LIGHTED)	SNOW	ICE	\$5001 TO \$10000
27	3/11/14	1948	2	1	0	REAR END	FOLLOWING TOO CLOSELY	DAWN/DUSK	CLEAR	DRY	\$5001 TO \$10000
28	3/30/14	1437	2	0	0	BACKING CRASH	UNSAFE BACKING	DAYLIGHT	CLEAR	DRY	\$2501 TO \$5000
29	5/9/14	0114	1	0	0	COLLISION WITH DEER	ANIMAL/OBJECT IN ROADWAY	DARK (NOT LIGHTED)	CLEAR	DRY	UNDER \$1001
30	9/5/14	1442	3	0	0	REAR END	FOLLOWING TOO CLOSELY	DAYLIGHT	CLEAR	DRY	\$5001 TO \$10000
31	2/8/15	2354	1	0	0	COLLISION WITH DEER	ANIMAL/OBJECT IN ROADWAY	DARK (NOT LIGHTED)	CLOUDY	DRY	\$2501 TO \$5000
32	6/4/15	1217	2	0	0	SAME DIRECTION SIDESWIPE	FAILURE TO YIELD RIGHT OF WAY	DAYLIGHT	CLEAR	DRY	\$2501 TO \$5000
33	6/17/15	0559	2	2	0	RIGHT ANGLE	FAILURE TO YIELD RIGHT OF WAY	DARK (NOT LIGHTED)	RAIN	WET	\$5001 TO \$10000
34	6/17/15	0807	2	0	0	LEFT TURN	FAILURE TO YIELD RIGHT OF WAY	DAYLIGHT	RAIN	WET	\$1001 TO \$2500
35	8/18/15	1449	2	0	0	REAR END	SPEED TOO FAST FOR WEATHER CONDITIONS	DAYLIGHT	RAIN	WET	\$2501 TO \$5000
36	9/30/15	0712	2	0	0	REAR END	FOLLOWING TOO CLOSELY	DAWN/DUSK	CLEAR	DRY	UNDER \$1001
37	10/9/15	0719	2	0	0	RIGHT ANGLE	FAILURE TO YIELD RIGHT OF WAY	DARK (NOT LIGHTED)	CLOUDY	DRY	\$2501 TO \$5000
38	10/28/15	1445	1	1	0	RAN OFF ROAD	RAN OFF ROAD RIGHT	DAYLIGHT	RAIN	WET	\$1001 TO \$2500

Crashes Occurring at Harrison HS
Crash involving a scooter

Crash Summary, 2011 - 2015

General		
Number of Crashes	38	
Property Damage Only	28	73.7%
Injury Crashes	10	35.7%
Fatalities	0	0.0%

Crashed Involved		
Auto	37	97.4%
Pedestrian	0	0.0%
Scooter	1	2.6%

Manner of Collision		
Rear End	14	36.8%
Right Angle	8	21.1%
Ran Off Road	7	18.4%
Head On	3	7.9%
Same Direction Sideswipe	2	5.3%
Backing Crash	1	2.6%
Collision with Deer	1	2.6%
Left Turn	1	2.6%
Opposite Direction Sideswipe	1	2.6%

Primary Factor		
Following Too Close	10	26.3%
Failure to Yield Right-of-way	10	26.3%
Animal/Object in Roadway	5	13.2%
Ran Off Road, Right	4	10.5%
Speed Too Fast for Weather Conditions	4	10.5%
Roadway Surface Condition	2	5.3%
Left of Center	1	2.6%
Other (Driver)	1	2.6%
Unsafe Backing	1	2.6%

Light Condition		
Daylight	19	50.0%
Dark (not lighted)	12	31.6%
Dawn/Dusk	6	15.8%
Dark	1	2.6%

Weather Condition		
Clear	17	44.7%
Rain	11	28.9%
Cloudy	8	21.1%
Snow	2	5.3%

Surface Condition		
Dry	21	55.3%
Wet	13	34.2%
Snow/Slush	2	5.3%
Ice	2	5.3%

Damage Estimate		
Under \$1,001	5	7.5%
\$1,001 to \$2,500	11	16.4%
\$2,501 to \$5,000	10	14.9%
\$5,001 to \$10,000	10	14.9%
\$10,001 to \$25,000	2	3.0%

Age		
14 and Younger	1	1.5%
15 – 19	23	34.3%
20 – 29	7	10.4%
30 – 39	5	7.5%
40 – 49	14	20.9%
50 – 59	11	16.4%
60 – 69	3	4.5%
70 – 79	1	1.5%
Not Reported	2	3.0%

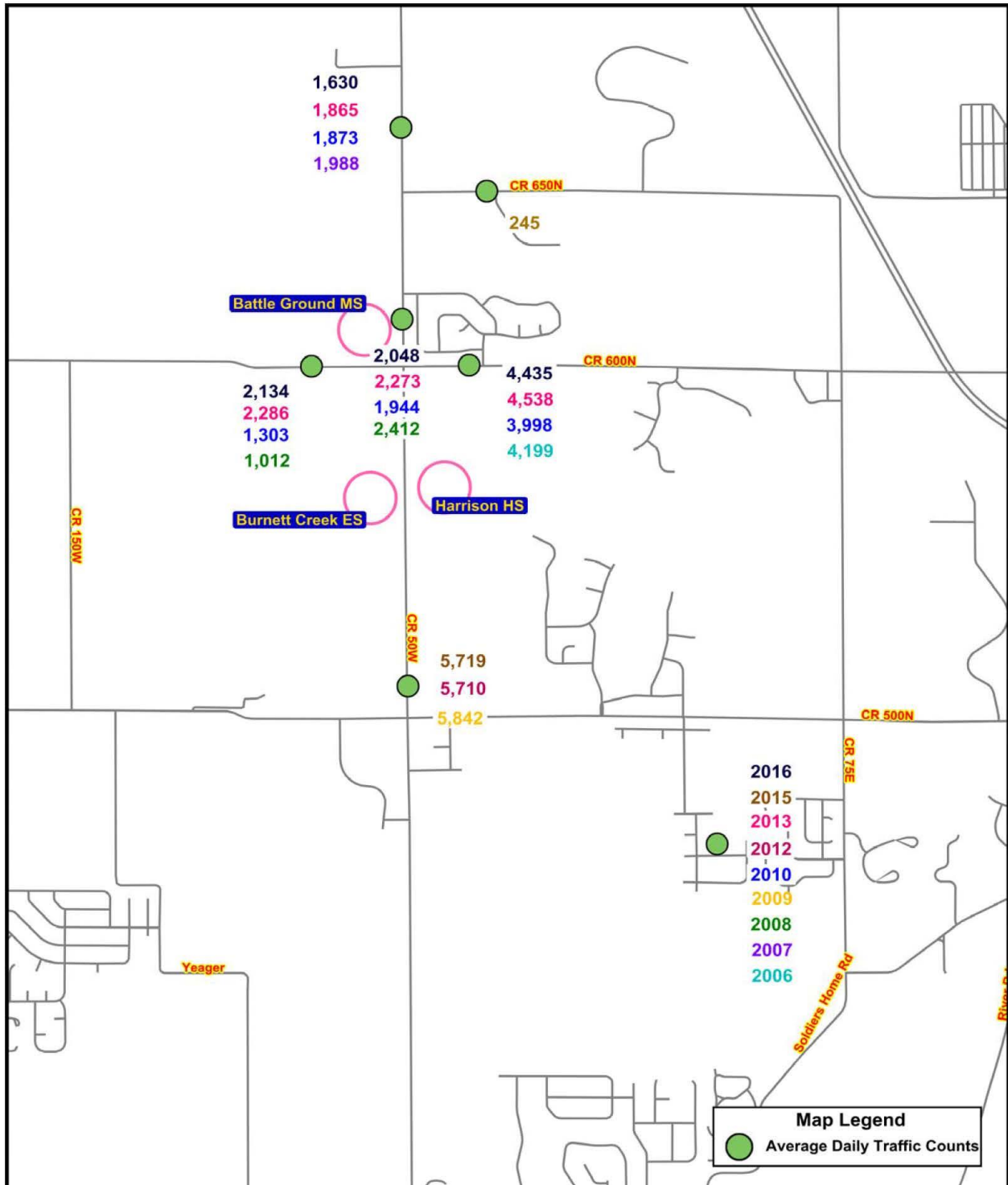
Crash Report Narrative Summary

Crash Number	Summary
1	Vehicle attempted to pass a school bus. While merging into the other lane to pass, this passing vehicle struck another vehicle.
2	Vehicle stopped, attempting to turn. Another vehicle pulled up beside that stopped vehicle, and blocked the vision of the driver. The stopped vehicle slowly moved forward to try to see around the vehicle blocking vision. It pulled too far forward, causing a right angle crash with an oncoming vehicle.
3	Vehicle attempting to turn, and pulled out in front of another vehicle, causing a right angle crash.
4	Vehicle slowing down in traffic. Another vehicle did not stop in time, and rear ended the vehicle that was slowing down.
5	Vehicle attempting to turn, and pulled out in front of another vehicle, causing a right angle crash.
6	Vehicle stopped at an intersection. Another vehicle did not stop in time, causing a rear end crash.
7	Vehicle stopped, waiting to turn. Another vehicle did not stop in time, causing a rear end crash.
8	Vehicle was traveling, when the driver, who appeared to be drunk, lost control of the vehicle. The vehicle left the road and rolled over.
9	Vehicle was traveling in a curve. Another vehicle going the opposite direction went to the left of the centerline, causing the first vehicle to be forced off the curve and into a field.
10	Vehicle waiting to make a left turn. Another vehicle turned into the vehicle that was waiting to make the left turn.
11	An animal ran out into the road. The driver of a vehicle swerved to avoid the animal, and ran off the road.
12	Two vehicles were stopped in traffic. A vehicle did not stop in time, and rear ended one of the stopped vehicles. That stopped vehicle was pushed into another stopped vehicle, causing a three car crash.
13	Vehicle stopped, waiting to turn. Another vehicle did not stop in time, causing a rear end crash.
14	A deer entered the road. Vehicle was unable to stop or swerve, and hit the deer.
15	Vehicle slowing down in traffic. Another vehicle did not stop in time, and rear ended the vehicle that was slowing down.
16	Vehicle stopped at an intersection. Another vehicle did not stop in time, causing a rear end crash.
17	Vehicle was traveling on an icy road. Driver lost control of vehicle, and it spun into the path of an oncoming vehicle, causing a sideswipe crash.
18	Vehicle slowing down in traffic. Another vehicle did not stop in time, and rear ended the vehicle that was slowing down.
19	Bicyclist traveling on the wrong side of the road. A vehicle came to a complete stop when the driver saw the bicyclist approach. The bicyclist did not stop in time to avoid a crash, and ran into the stopped vehicle.
20	Vehicle slowing down in traffic. Another vehicle did not stop in time, and rear ended the vehicle that was slowing down.
21	Two vehicles were stopped in traffic. A vehicle did not stop in time, and rear ended one of the stopped vehicles. That stopped vehicle was pushed into another stopped vehicle, causing a three car crash.

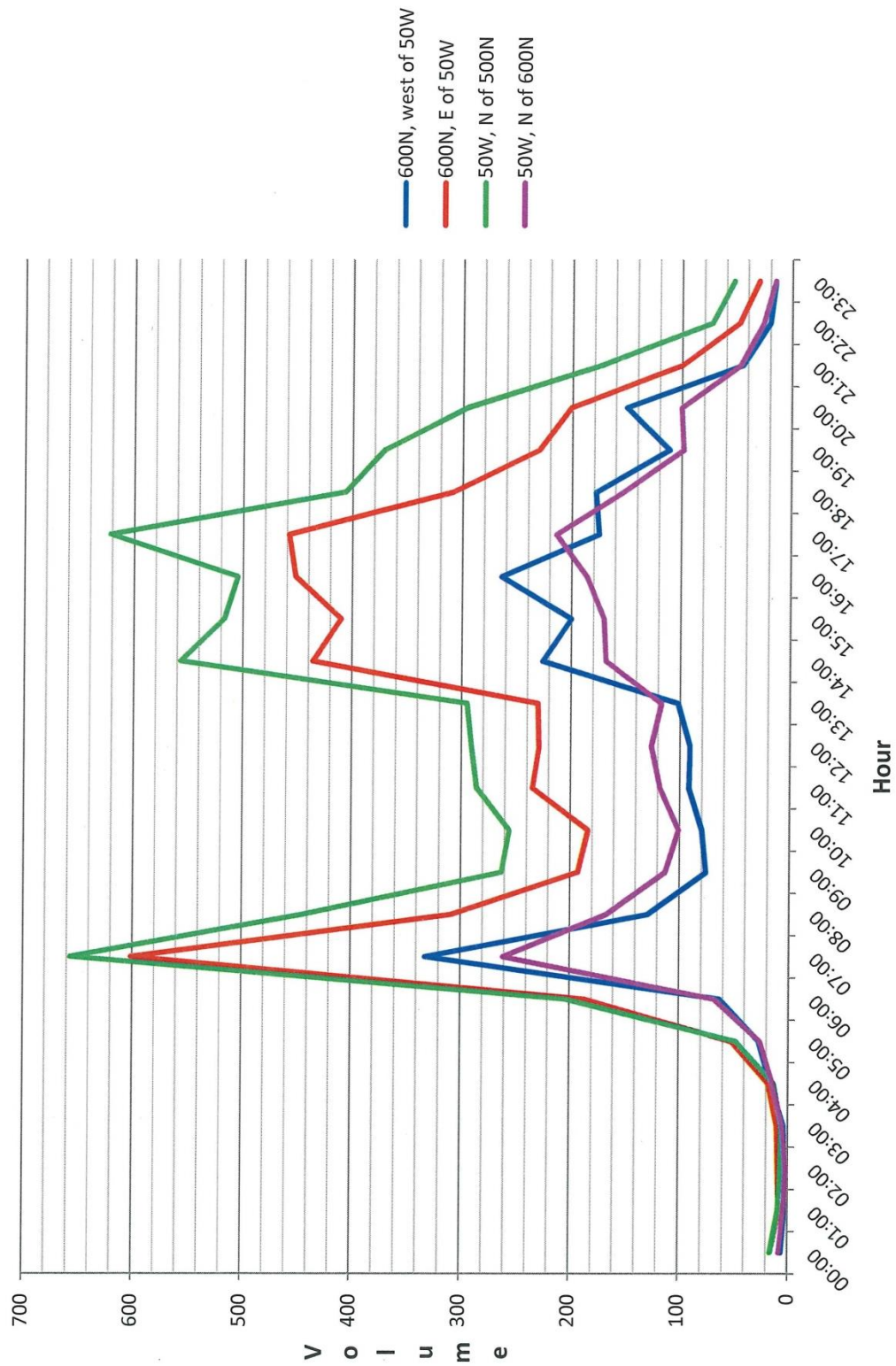
Crash Report Narrative Summary

Crash Number	Summary
22	Vehicle was traveling on a wet road. Driver lost control, and the vehicle ran off the road and hit a fence post.
23	Vehicle traveling along a curve. Driver lost control of the vehicle due to icy road conditions. Vehicle ran off the road and rolled over.
24	A deer entered the road. Vehicle was unable to stop or swerve, and hit the deer.
25	Vehicle turning left, hit another vehicle that was traveling straight.
26	Vehicle attempted to stop at an intersection. Due to an icy roadway, the vehicle was unable to stop, and ran off the road into an embankment.
27	Vehicle was slowing down to stop at an intersection. Another vehicle did not stop in time, causing a rear end crash.
28	Vehicle backed up and hit a vehicle legally parked on the side of the road.
29	A deer entered the road. Vehicle was unable to stop or swerve, and hit the deer.
30	Two vehicles were stopped in stop and go traffic. A vehicle did not stop in time, and rear ended one of the stopped vehicles. That stopped vehicle was pushed into another stopped vehicle, causing a three car crash.
31	A deer entered the road. Vehicle was unable to stop or swerve, and hit the deer.
32	Vehicle turning left, hit another vehicle that was traveling straight.
33	Vehicle stopped at an intersection on a wet road. Another vehicle did not stop in time, causing a rear end crash.
34	Vehicle turning left, hit another vehicle that was traveling straight.
35	Vehicle slowing down in traffic on a wet road. Another vehicle did not stop in time, and rear ended the vehicle that was slowing down.
36	Vehicle was slowing down to stop at an intersection. Another vehicle did not stop in time, causing a rear end crash.
37	Vehicle turning left, hit another vehicle that was traveling straight.
38	Vehicle trying to turn. Due to wet pavement, driver lost control of the vehicle, and it ran off the road, striking a utility pole.

Traffic Counts

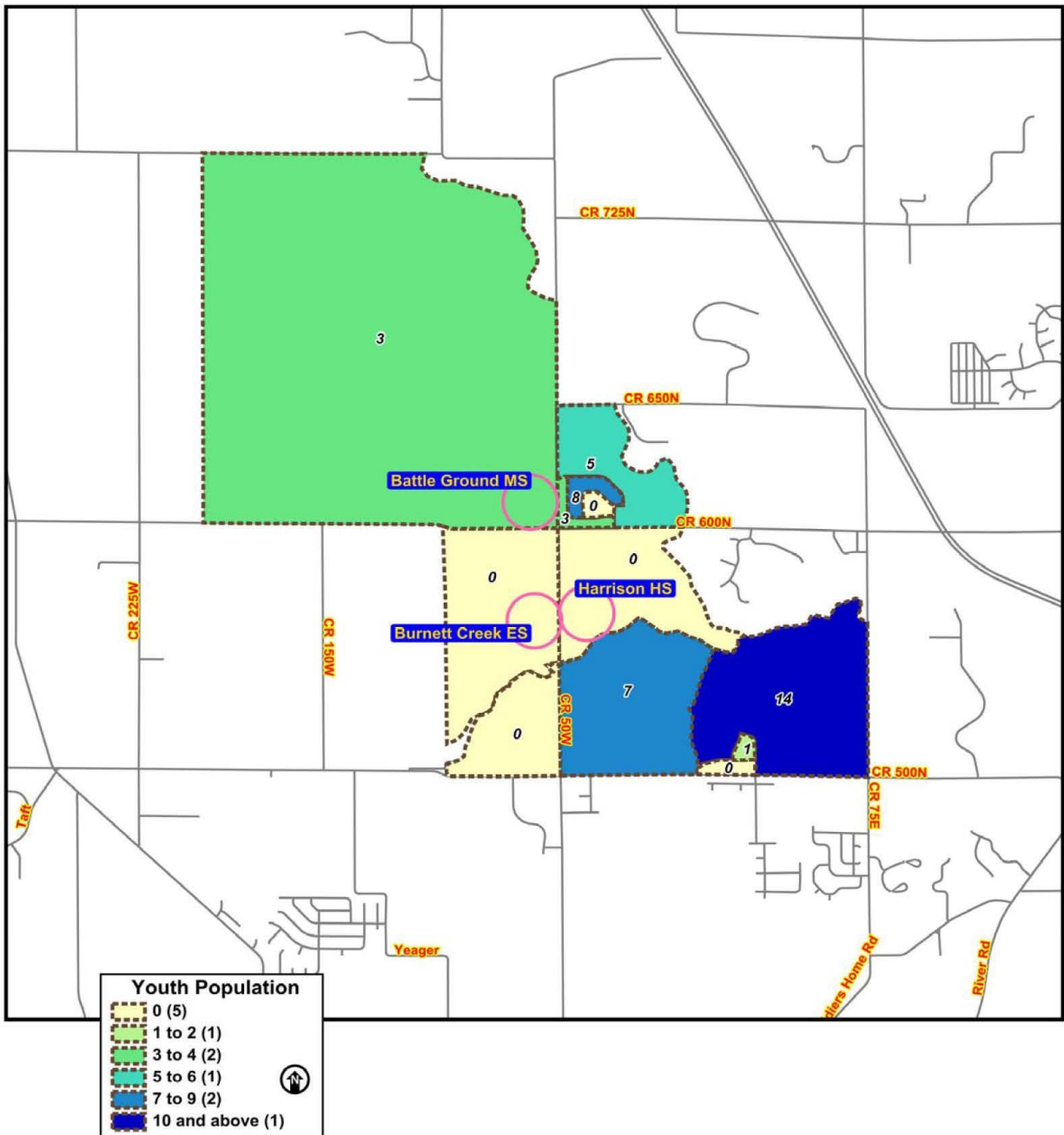


2013 Average Hourly Traffic Volumes



Youth Population Age 5 Through 19

2010 Decennial Census

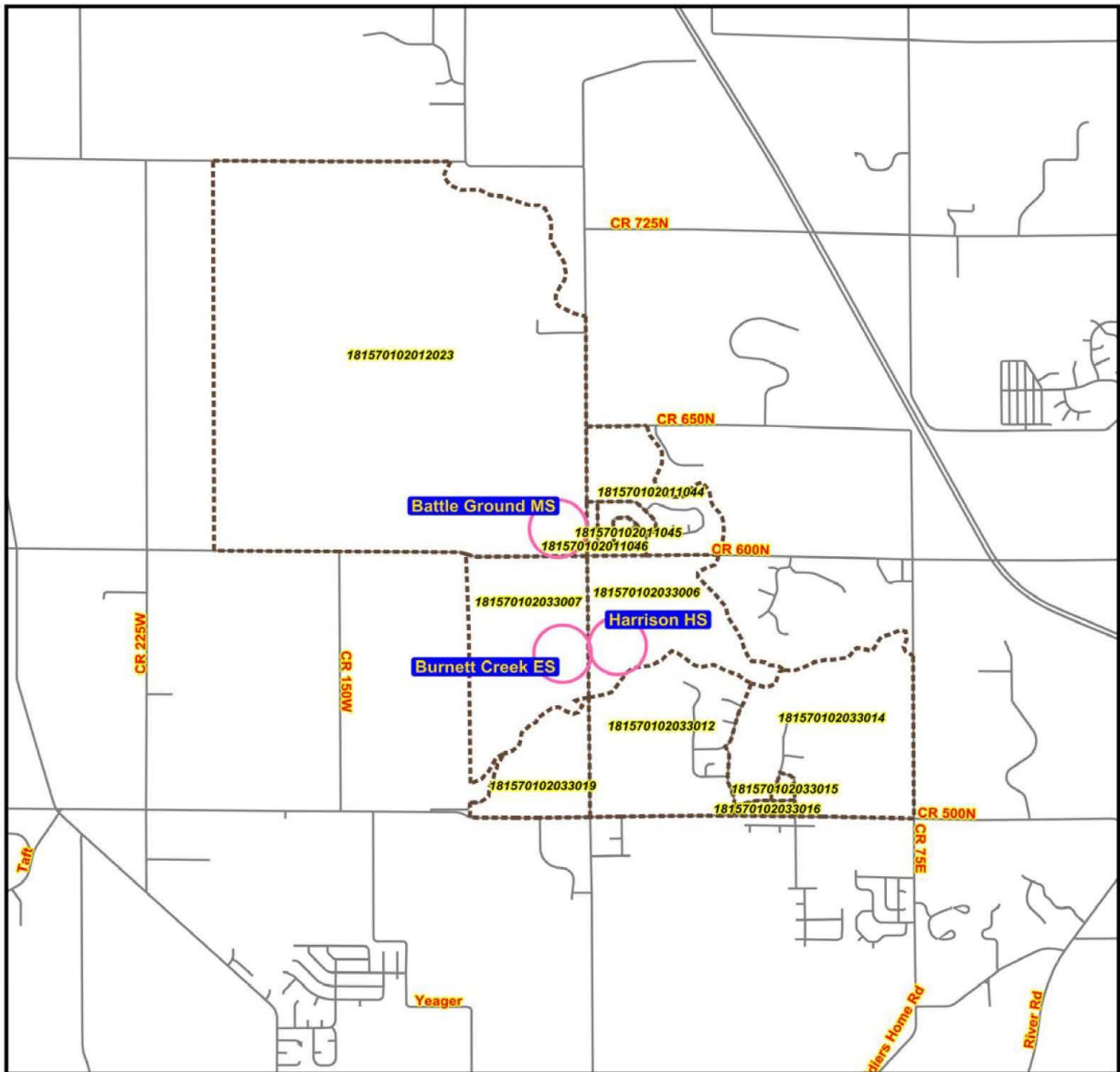


Harrison Road Safety Audit
2010 Decennial Census Data

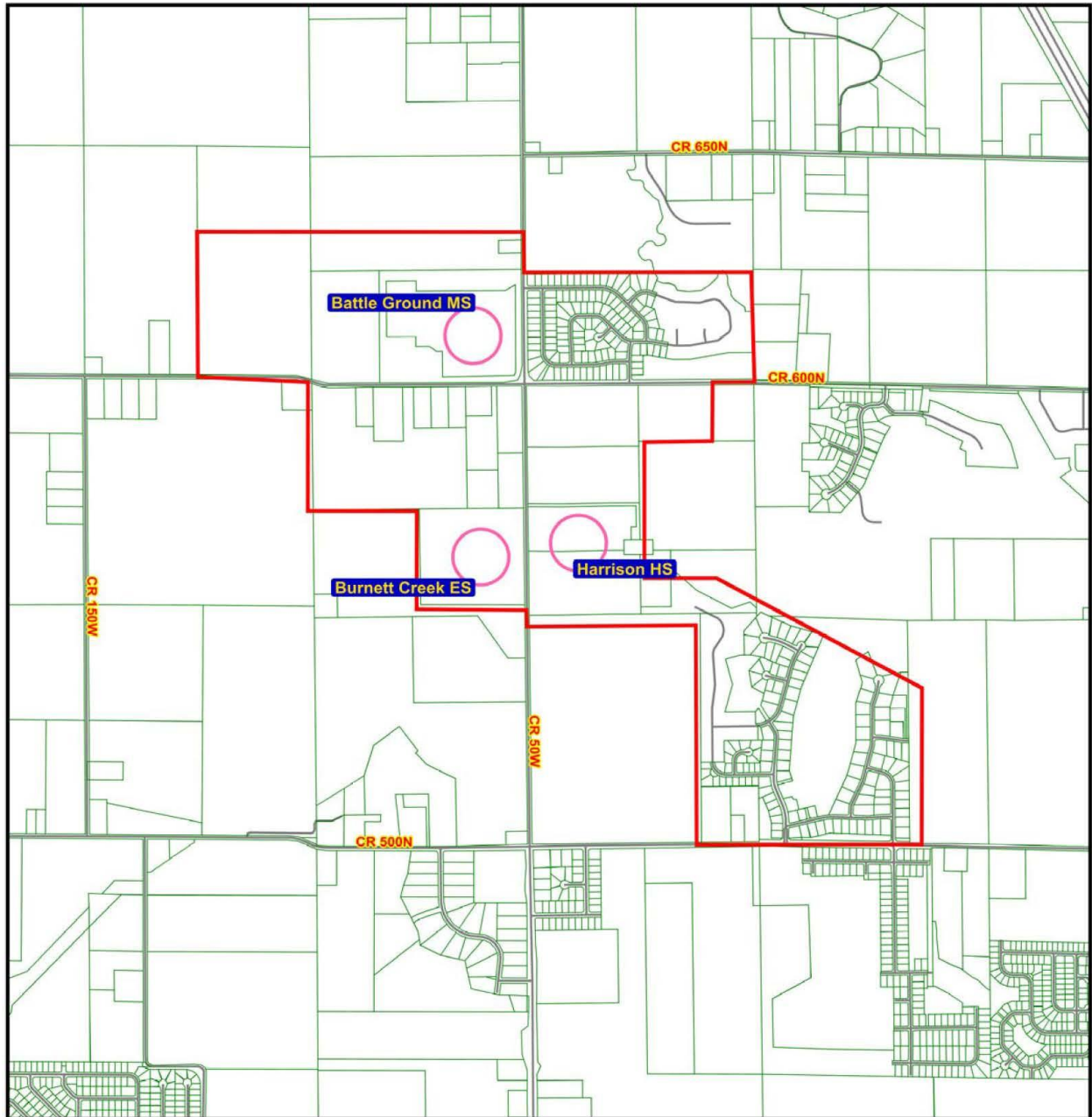
Census Block	Total Population	Male, 5-9	Male, 10-14	Male, 15-17	Male, 18 & 19	Female, 5-9	Female, 10-14	Female, 15-17	Female, 18 & 19	Total Youth Population	Percent
181570102011043	69	2	1	1	3	5	1	4	0	17	24.6%
181570102011044	103	9	4	1	0	6	6	3	1	30	29.1%
181570102011045	43	5	2	0	0	5	2	0	0	14	32.6%
181570102011046	26	2	0	3	0	1	1	0	0	7	26.9%
181570102012023	52	0	2	0	1	1	1	2	0	7	13.5%
181570102033006	3	0	0	0	0	0	0	0	0	0	0.0%
181570102033007	22	1	0	0	0	0	2	0	0	3	13.6%
181570102033012	226	7	5	3	0	5	7	3	1	31	13.7%
181570102033014	136	6	6	6	0	6	9	4	4	41	30.1%
181570102033015	15	0	1	1	0	1	0	0	0	3	20.0%
181570102033016	8	0	1	0	0	0	0	0	0	1	12.5%
181570102033019	9	0	0	0	0	1	0	0	0	1	11.1%
Total	712	32	22	15	4	31	29	16	6	155	21.8%

Census Block	Households	Total Occupied	Total Vacant	Total Population	Persons per Household
181570102011043	45	22	23	69	3.1
181570102011044	32	29	3	103	3.6
181570102011045	23	13	10	43	3.3
181570102011046	23	9	14	26	2.9
181570102012023	21	21	0	52	2.5
181570102033006	2	2	0	3	1.5
181570102033007	9	9	0	22	2.4
181570102033012	59	57	2	226	4.0
181570102033014	46	41	5	136	3.3
181570102033015	5	5	0	15	3.0
181570102033016	4	4	0	8	2.0
181570102033019	4	4	0	9	2.3
Total	273	216	57	712	3.3

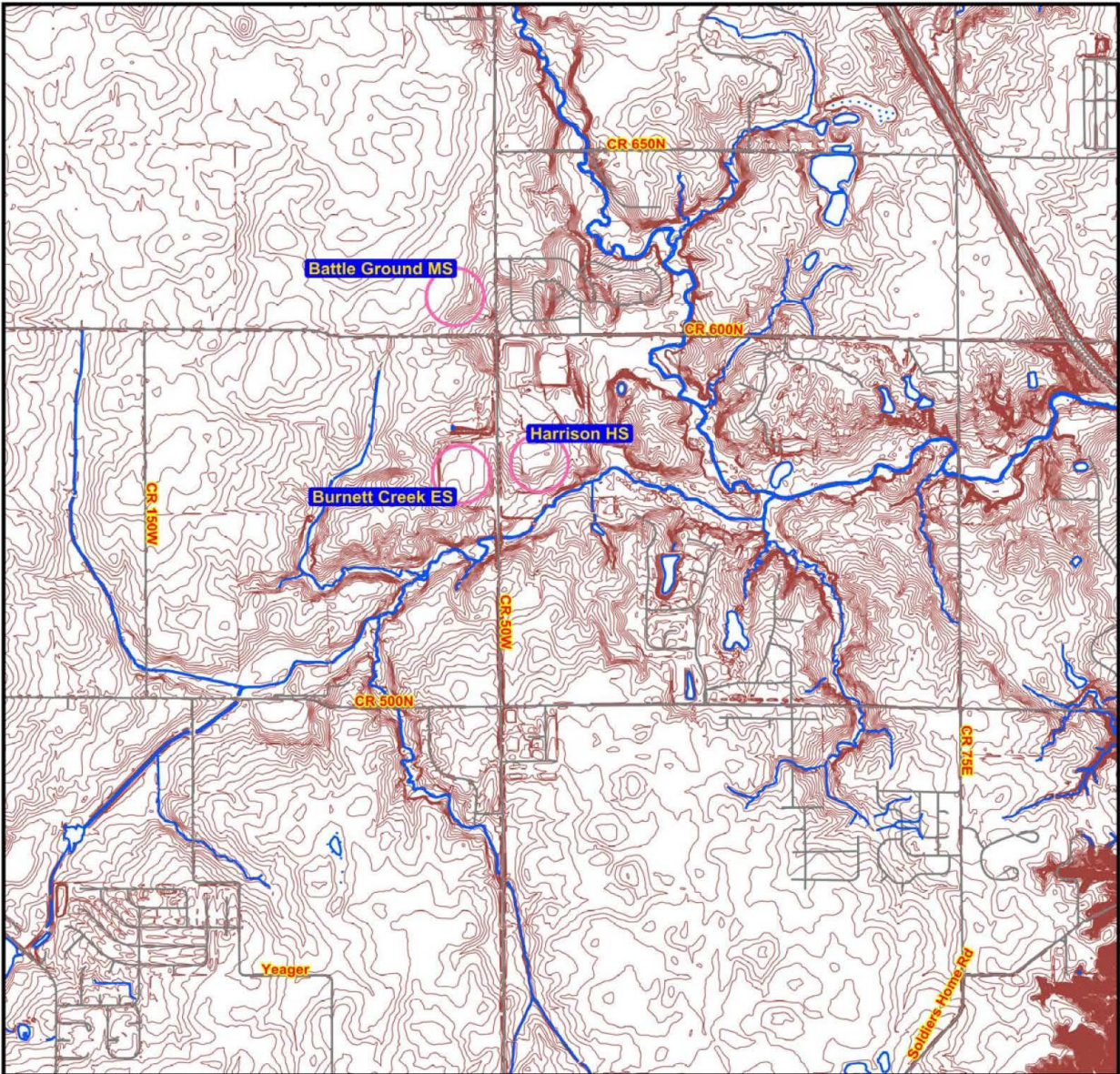
2010 Decennial Census Block Map



Parcel Boundaries



Elevation Contours



Map Legend
Contours



Zoning

